

**Nutrient Management Training and Certification Regulations
Technical Advisory Committee Meeting Minutes
Virginia Department of Forestry Training Room
Charlottesville, Virginia
June 17, 2004**

Introductions and Charge of Committee

Mr. Jack Frye opened the meeting with the following statement:

Good morning, my name is Jack Frye with the Department of Conservation and Recreation. I am the Division Director for the Division of Soil and Water Conservation. I want to welcome you here to the first Technical Advisory Committee for our Nutrient Management Training and Certification Regulations.

Everyone should have an agenda for today and also a list of the folks who are on the Technical Advisory Committee.

This committee has been formed by the Department to assist and advise the Department in considering the development and adoption of revised requirements for nutrient management planning and certification of nutrient management planners.

As you can see by the committee membership, the Department has attempted to seek participation on the technical advisory committee from all persons and stakeholders affected by the nutrient management training and certification regulations. You have been provided a copy of the committee membership.

We have also retained the assistance of the Institute of Environmental Negotiation at the University of Virginia to assist us in facilitating the meetings of this committee and ensuring that the meetings are as productive as possible for the Department and the committee.

We also have several other DCR staff present to serve as technical resources to the TAC and participate in the discussions and to assist and manage the regulatory and administrative function of the TAC.

Mr. Frye introduced Tanya Denckla Cobb as the facilitator for the meeting.

Ms. Denckla Cobb welcomed members, introduced Christine Gyovai also with IEN, and noted that in the future, Bruce Dotson would be participating in the meetings. Members were then asked to introduce themselves, give their affiliation, and state in what capacity they dealt with Nutrient Management Practices. The meeting attendance list is provided as Attachment #1

Following the introductions, Mr. Frye gave the charge to the committee.

The Notice of Intended Regulatory Action (NOIRA) outlined several issues that the

Department feels need to be addressed in revised regulations.

Overall - revised criteria for nitrogen and phosphorus based nutrient management planning capable of minimizing the effects of nitrogen and phosphorus impacts on ground and surface waters and various technical amendments and updates.

We believe that modifications to the nitrogen and in particular addition of phosphorus management practices are necessary to reduce water quality impacts from land application of fertilizer, animal manure, sewage sludge, and industrial wastes.

As will be outlined, there is an increased regional (i.e., Chesapeake Bay Program) and national focus (Animal Feeding Operations) on the management of phosphorus. Requirements for phosphorus based nutrient management planning exist or are proposed in federal and state legislation, regulations, and incentive programs.

In addition, EPA has already provided guidance to states for developing water quality standards for nitrogen and phosphorus and Virginia will likely have water quality standards for both within 3-4 years.

The Department also intends to consider amendments to the nitrogen application criteria in nutrient management plans to better address the timing of land application of nitrogen containing materials.

Further, the Department is considering other technical amendments to the nutrient management criteria to include an updating of Virginia soils by management group and productivity group to include those soil series established since the last regulatory action, the addition of several crops and other technical amendments.

In reference to the evaluation of potential phosphorus criteria for nutrient management plans, the Department seeks to identify criteria and procedures that meet several objectives. As specified in the NOIRA, phosphorus criteria should:

- (1) protect water quality by controlling soil concentrations of phosphorus and phosphorus loadings,
- (2) be straightforward and time efficient to apply,
- (3) produce consistent results when applied by different persons,
- (4) be relatively easy to understand and convey to farmers, and
- (5) be reasonably compatible with nutrient management planning software presently utilized in Virginia.

I would ask the TAC to keep these objectives in mind when criteria and methods for phosphorus based planning are discussed and recommended.

We look forward to working with the TAC to seek input into the development of the regulations. The Department believes the TAC's primary responsibility is to collaboratively contribute to a regulation that is in the best interest of the Commonwealth as a whole.

The role of this TAC is advisory; the Department will review and consider all recommendations of the TAC in the development of the proposed regulation.

As I mentioned, the Institute for Environmental Negotiation will be assisting the Department in coordinating the TAC. Bruce Dotson and Tanya Denckla Cobb are the lead IEN staff who will be providing assistance along with supporting IEN staff they may need to participate.

Tanya will be providing facilitation assistance for this meeting and at this time I would like to turn the meeting over to Tanya to have her give you a quick outline of the Committee Operation and Ground Rules as we move into our agenda. Additional copies of the agenda and other materials are also available.

Committee Operation and Ground Rules

The facilitator recapped the main points:

- By September, the TAC is being asked to provide advisory recommendations to DCR for the new regulations.
- Consensus is preferable, if possible, as it will provide a stronger set of recommendations for consideration.
- The most important issues for the TAC to address are phosphorus management and the timing of nitrogen application.

DCR Staff Roles:

- Provide information needed by TAC
- Provide their best professional opinions and perspectives (which do not necessarily reflect official Agency policy)
- Record meetings, draft minutes, and prepare summaries
- Logistical support

Facilitation Team Roles:

- Ensure the TAC process is fair and balanced
- Ensure that everyone has the opportunity to be heard.
- Identify and help build common ground
- Play devil's advocate, i.e. "what do you mean? How will that work?"

The facilitator then proposed possible guidelines for the TAC to enable productive discussion, which after discussion and amendment the TAC accepted.

- Listen for new information and understandings.
- Work to satisfy your (organization/constituent) interests while satisfying others too. Listen carefully to what is going on for other people.
- Provide an opportunity for all to be heard. Be concise.
- One conversation at a time. Hold sidebar conversations for breaks.
- The TAC will strive to make recommendations by consensus. Consensus is defined as:

While individual members may have some remaining questions and concerns about individual elements of the proposal, all members are able to live with the overall proposal, and all will support all of the elements of the proposal, not just the parts they like best

- Even in the event of not achieving consensus, the TAC will not vote on its proposals as this would enable some interests to “win” over others. The goal of the TAC is to try to find and build common ground and develop recommendations to satisfy all participants’ interests.

A member asked about questions during presentations. The facilitator noted that there are two considerations. The committee wants to get through the presentations and yet also wants to make sure the presentations are understood. Questions for clarification would be acceptable.

Another member asked if, in the event a principal member could not make the meeting, was it acceptable to send a substitute. The facilitator noted that a substitute would be acceptable but that they would need to be briefed prior to the meeting. The committee will not backtrack for that person. Staff asked that members notify DCR if there would be a substitute.

A member also noted that it would be helpful for those who are not intimately involved with the details of writing plans if jargon was avoided.

Establishing Need

At this point in the program, staff presented an “*Overview of existing programs/agencies involving nutrient management planning*”. Text for the presentation PPT slides may be found as Attachment #2.

Following the presentation, the facilitator asked staff to clarify what was driving the need for regulatory action. Was it the poultry waste management legislation? The facilitator also asked about the amount of time DCR has to come into compliance. Staff stated the Poultry Waste Management Act requires DCR to consider and implement any changes to its criteria for nutrient management plans (NMPs) by December 31, 2005. Staff continued, that in addition to the poultry language, changes are also required to address federal standards regarding confined animal feeding regulations. The Commonwealth must also develop as soon as possible phosphorus criteria for NMPs to meet federal standards regarding confined animal feeding operations, to be fully implemented in 2006 in order for Virginia to implement the EPA federal permit program.

A member mentioned that NRCS does have a national policy that people they work with are given cost share must have phosphorus addressed on those farms. It was noted that Virginia was one of a few states that did not consider phosphorus in its NMPs.

Presentations continued with staff providing the following materials on “*Current DCR practices in nutrient management planning*”. Text for the presentation PPT slides may be found as Attachment #3.

The facilitator asked if a cover crop would be appropriate if a farmer wanted to have a fall application of nitrogen. Staff responded that timely planted small grain would be more appropriate than application to winter fallow.

A member said he would like to expand the discussion on winter application. He said that it was a complex issue. He noted that with biosolids management, contractors are required to haul 365 days a year. Contractors must figure out an alternative to land application to manage that material. The facilitator noted that it will be part of what the committee will be looking at. She said that one thing that was not clear in terms of biosolids was that they could be applied 365 days a year. She asked staff to address other nutrients.

Staff said that per the regulations it is preferred to see the application within 30 days of planting the crop. If you make an application of nitrogen when the crop isn't growing the potential for leaching through the roots is greater. There should be no application December through March.

The facilitator asked if there were restrictions as to when dairy waste or poultry waste can be spread that biosolids do not have. Staff said that the regulations just address all nutrients. Staff also noted the law for confined animal feeding operations requires that they have storage so that they don't apply during the periods when the risk of loss is high. It was further noted that it was important to remember that these requirements are only for certain operations. The operators who have these requirements are those required by another regulation or incentive program.

A member noted that with the information regarding phosphorus, and the fact that farmers must deal with varying weather conditions, it is important to have a gage. He referred to the development in Northern Virginia and asked how much phosphorus was in the water system through municipal waste facilities. He said that it was important to be able to determine how much is contributed by humans as opposed to farming operations. This item was placed on a parking lot list for future response.

The facilitator asked if the TAC agreed with the proposition that there is a need to change the regulations to incorporate consideration for phosphorus. She tested for consensus that there is a need for phosphorus management, and the issue is how, not whether. The group concurred with no objections.

A handout was distributed that listed issues for consideration in revising the regulations, drawn from public letters responding to the NOIRA and also identified by the DCR. Committee members were asked to identify additional issues for consideration. The initial list of issues identified to date follows:

I. ADMIN ISSUES/QUALIFICATIONS

- Certification fees
- Requirements for certification (recertification/training for P)
 - Standard level of training for competency
 - Do personnel know what they are looking at? – for existing permits

II. NMP PROCEDURES

- Phosphorus Management
 - Applicability of criteria to all sources
 - Methods for P Management
 - Poultry law requirements (at least as stringent as poultry)
 - Need to use approaches that are science based
 - P coefficient for biosolids
 - Need to reduce soil phosphorus on highly loaded soils
- N Application
 - Timing - more uniform recommendations and clarity
 - Use of “average” weather conditions to evaluate practices
 - Evaluating N residuals used in NMP (Wx impacts variability)
 - Evaluate nitrogen residuals in organic wastes for years 2-4
 - NMP rates for N should reflect changes in cropping systems (no till)
 - Standards and Criteria (Pg 34) – Corn grain – timely N application for side dressing corn similar to cotton
- VALUES technical revision
- Potential revision of Nitrate Leaching Index
- Wheat and barley standards/criteria applied to grain and silage?
- Contingency plan for emergencies
- Flexibility for site-specific modifications, and considerations for weather
- Flexibility needs to be straight forward, able to be implemented by users
- Clear guidance on cover crops
- Organic farming – how will regulations impact?
- Soil testing procedures:
 - Standard soil depth for all tests
 - Use of colormetric soil testing procedures should not be allowed
 - P-testing – not testing plants Mehlich – 1 testing – uptake too aggressive
 - Establish average assumed weather conditions – seasonal conditions
 - Soil sample – ensuring that sampling is representative of all soil types on property
 - Need to establish standard soil depth
 - Plans need to address varying soil types and different bedrocks that are found in Virginia
 - If regulations are based on P-Index should cover majority of soil types in VA
- Clearinghouse/recording system straightforward, streamlined plans for multiple agencies
- Accountability and Enforcement Issues
 - Issue of planner writing a plan and then no longer being involved in plan
 - Enforceability of NMP (specifically in regard to improving water quality) – do personnel know what they are looking at? – for existing permits
 - Section 100 – compliance and regulatory action. Does DEQ have the resources and tools to take enforcement of planners in plan writing.
 - Plans need to be readily enforceable
- General Plan Issues
 - 3-year rotation schedule - need adaptability and flexibility. How to deal with multiple changes

- One plan for one farm – NMP
- Need to be specific about type of plan
- Want plans to be active and useful for farmers
- Significant support for not privatizing plan-writing keep w/in DCR
- Decisions by group need to be implementable and realistic
- Maintain balance w/flexibility
- NMP recommendations for non-polluting nutrients (K, Boron, etc.)
- Best Management Practices
 - 100-foot buffer strips
 - Use of buffer amendments such as alum and lime prior to application on litter or on ground before applied.
 - Ensuring that H2O quality is maintained in BMPs, other for runoff

After a lunch break, the facilitator asked members to consider their calendars for the scheduling of future meetings. Members were polled for various meeting dates in July, August, and September. It was noted that the meetings will be held either in Charlottesville or Richmond and that the members would be contacted regarding the final dates selected.

The facilitator asked for other issues of concern. Items noted were as follows:

- a need to establish average weather conditions for evaluation purposes.
- a concern that in the NMP there is no plan for emergencies.
- a need for recommendations from the TAC be practical and implementable.
- a problem that a NMP has a three-year rotation and that it is impossible to know what crops he will plant three years in advance.
- an observation that because of varying soil types and different bedrocks that it would be difficult to develop one plan that applies to everywhere in Virginia.
- a hope that the plan developed would not only implementable, but also science based.

Defining “success” for TAC process/ needs for achieving success

The facilitator lead a discussion about how the TAC would define success for the new regulations. The TAC identified specific goals by which they could later assess the proposed revisions to the regulations. The facilitator noted that many of these goals could be seen as competing, and that the revisions would need to balance these different goals. The following set of goals for revisions to the regulations were identified:

Administrative

- Easy to implement by planners and farmers
- Avoid creating new loopholes
- In line with EPA and DEQ guidelines

Environmental

- Limiting pollution as best we can from many sources
- Methods are science based
- As strong as possible in nitrogen and phosphorus while recognizing it needs to be

workable

- Improve soil nutrient levels of those degraded over a long time.
- Improve stream water quality – swimmable/fishable

Economic

- Does not adversely affect a farmer's ability to make a living
- Protecting livelihoods of watermen and other water related livelihoods
- Minimizing farmers expenditures on fertilizer/maximum use of resources

Social

- Finding a way to share both costs and benefits with larger society/public
- Educate the larger public about what has accomplished and programs
- Socially equitable/fair
- Equity among all sources
- Focus on actions that make the biggest difference in reality

Phosphorus: Initial Identification of Pros/Cons, Cost/Benefits of Three Methods (Soil test, Environmental threshold, P-Index)

Staff presented a Powerpoint that began to compare and contrast phosphorus management options. Text for the presentation PPT slides may be found as Attachment #4.

The facilitator asked for comments regarding the presentation. Dr. Mullins said that the presentation covered most of the relevant information and that he thought it important to note that residual build up of phosphorus is not all bad. He said it is only in the high range that it becomes problematic.

Following the presentation, the group began reviewing and adding to a list of advantages/disadvantages of each method, starting with the agronomic soil test. However, noting the time, the facilitator suggested that the TAC continue this discussion at its next meeting.

Public Comment

The facilitator asked for public comment and Doug Hughes with Tyson Foods spoke. He noted that nutrient management for the Shenandoah Valley was complex, and asked the TAC to keep a focus on the actual farmers, putting them first in consideration for changes with the regulations.

There was no additional public comment.

Adjourn

The facilitator thanked members for attending and noted that they would receive information regarding the next meeting date and location.

Attachment #1
Attendance List, June 17, 2004

TAC Members

George Ashman, Amelia County Poultry Grower
Dr. Asmare Atalay, Virginia State University
Dr. Theo Dillaha, Virginia Tech Biological Systems Engineering Dept.
Gary Flory, CNMP, Department of Environmental Quality
Gerald Garber, Augusta County Dairy Farmer
Mark Hedrick, CNMP, Pilgrim's Pride
Ann Jennings, Chesapeake Bay Foundation
Lynton Land, Northumberland Association for Progressive Stewardship
Chris Lawrence, CNMP, Natural Resources Conservation Service
Glenn Martin, Virginia Department of Agriculture and Consumer Services
Peter Maybach, CNMP, M&M Consulting
Steve McMahan, CNMP, Synagro
Dr. Greg Mullins, Virginia Tech Crop and Soil Environmental Science Dept.
Dr. Cal. Sawyer, Virginia Department of Health
Joedy Sheets, CNMP, Valley Fertilizer and Chemical
Kay Slaughter, Southern Environmental Law Center
Jim Tate (for Sharon Conner), Hanover-Caroline SWCD
Neil Zahradka, CNMP, Murphy-Brown

DCR Supporting Technical Staff

Jack Frye	Stuart Wilson
Russ Perkinson	David Kindig
Dean Gall	Joe Garner

DCR Regulatory Staff

Leon App	David Dowling
Michael Fletcher	

Facilitators

Tanya Denckla Cobb, UVA Institute for Environmental Negotiation
Christine Gyovai, UVA Institute for Environmental Negotiation

Others

Chad May, Tyson Foods
Susan Trumbo, Recyc Systems
Missy Neff, Aqualaw PLC
Wilmer Stoneman, Virginia Farm Bureau
Steve Dugent, Tyson Foods
Doug Hughes, Tyson Foods
Dale Gardner, Virginia State Dairyman

Attachment #2

PPT Presentation Slide Text for: Overview of existing programs/agencies involving nutrient management planning

SLIDE 1: Overview of Existing Programs/Agencies Involving Nutrient Management Planning

- VA Nutrient management training and certification
- VA Chesapeake Bay Preservation Act
- VA Sewage Sludge Land Application permits
- VA Permits for Confined Animal Feeding Operations
- VA Poultry Waste Management permits
- Federal NPDES permit regulations for confined animal feeding operations
- Federal NRCS 590 standard for nutrient management
- Virginia Incentive Programs

SLIDE 2: Nutrient Management Training and Certification Regulations

- Specify qualifications and conditions for individuals to be deemed competent in nutrient management plan preparation
- Specify conditions whereby a certificate can be suspended or revoked
- Establish baseline standards for Nutrient Management Plan (NMP) content and technical criteria
- Establish fees
- Goal - Manage nutrients for agronomic benefits and protection of ground and surface waters
- Nutrient Management Training and Certification Regulations do not require farmers to have NMPs. Other laws, regulations, or incentive programs require nutrient management plans

SLIDE 3: Chesapeake Bay Preservation Act

- Administered by the Virginia Chesapeake Bay Local Assistance Department
- 31 eastern Virginia tidewater counties - mainly east of I-95
- Requires 100 foot wooded or grass buffer from streams, wetlands, rivers, lakes connected to Chesapeake Bay unless BMPs implemented
- May reduce to 50 foot buffer with sediment or nutrient BMPs
- May reduce to 25 feet by implementing soil and water quality conservation plan (includes nutrient management component)
- Other land in Resource Management Areas (RMAs) may require site assessments and plans
- All nutrient management plans required must conform to criteria in DCR's Nutrient Management Training and Certification Regulations

SLIDE 4: Biosolids Use Regulations (Treated Sewage Sludge)

- Administered by Virginia Department of Health
- Code of Virginia modified in 2003 to require nutrient management plan by DCR certified planner on all sites

- Nutrient management plan pre-approval required for sites operated in conjunction with confined animal feeding operations of any size, and specified sites where sludge will be applied more frequently than once every 3 years

SLIDE 5: Virginia Pollution Abatement (VPA) permits

- Required for farms having 300 or more animal units (A.U.) of livestock in confinement
- 300 A.U.
 - = 300 beef cattle
 - = 200 dairy cattle
 - = 750 swine over 55 lbs. each
- DEQ issues and enforces permit
- DCR approved NMP required for each permitted farm

SLIDE 6: VPA Permit Requirements

- NMP is enforceable part of permit
- DEQ personnel inspect farms annually
- Manure storage requirements to address:
 - *no discharge unless greater than a 24 hour - 25 year storm event*
 - *times when application won't occur when crop uptake is limited, saturated ground, or frozen ground*
- Manure spreading setbacks from rock outcrops, streams, wells, etc.
- Farmer record keeping required for manure application fields (when, how much, crops)

SLIDE 7: Poultry Waste Management VPA Permits

- Impacts all poultry farms with at least 200 animal units
 - *20,000 broilers*
 - *11,000 turkeys*
- Similar requirements as VPA permits
- DCR approved NMP required
- Poultry litter storage requirements
- Phosphorus criteria in law effective 10/1/2001
- DCR must examine research and developments related to litter application, soil nutrient retention, water quality degradation and adopt changes by 12/31/05 if needed to protect water quality or reduce soil phosphorus concentrations or loadings

SLIDE 8: NRCS National Phosphorus Policy

- Requires NRCS state conservationists to require P based NMPs for EQIP Cost-share recipients and those receiving NRCS technical assistance.
- State NRCS offices must choose between three methods of determining P based plans or a combination of the three:
 - Agronomic Soil Test Phosphorus Recommendations
 - Environmental Threshold Soil Phosphorus Levels
 - Phosphorus Site Index

SLIDE 9: EPA Confined Animal Feeding Operation (CAFO) Regulations

- Federal regulation 40CFR Parts 9, 122, 123, and 412 require states to adopt nutrient management plan criteria for large CAFO farms
- Federal regulations require NMPs to address both N and P
- For phosphorus, use of one of three methods of P based planning (similar to NRCS) or alternative methods

SLIDE 10: Virginia Incentive Programs Requiring NMPs

- Certain BMP cost-share recipients
- Certain BMP tax credit recipients
- Precision equipment income tax credit recipients

Attachment #3

PPT Presentation Slide Text for: Current DCR practices in nutrient management planning

SLIDE 1: Issues to Address

- Phosphorus rates - Organic Sources
- Timing of Nitrogen Applications

SLIDE 2: Current Phosphorus Criteria - 4 VAC 5-15-150.2.b

- ...phosphorus application rates should be managed to reduce adverse water quality impacts. Whenever possible, phosphorus applications from organic nutrient sources should not exceed crop needs based on a soil test over the duration of the crop rotation.

SLIDE 3: Current Phosphorus Criteria - 4 VAC 5-15-150.2.c

- The development and implementation of a comprehensive soil conservation plan or practices that meet the criteria for a conservation system....shall be recommended by a nutrient management planner on sites designated as highly erodible land (HEL) by NRCS where a soil analysis indicates a very high phosphorus level and phosphorus applications from organic sources will exceed crop uptake.

SLIDE 4: Phosphorus Issue - “Myths” - Sharpley-1997

- Originally phosphorus management was linked to erosion-control erosion and phosphorus loss is controlled
- Research now shows phosphorus is lost as sediment P and dissolved P
 - dissolved P is readily available for aquatic plant growth
- Soils will always “tie-up” phosphorus
- More phosphorus is released from soil to runoff or leaching water as phosphorus saturation or the amount of phosphorus sorbed increases with phosphorus additions

SLIDE 5: Phosphorus Issue - “Myths or Changes in Farming Practices?”

- Changes in agriculture
 - increased use of fertilizer to improve crop yields
 - conservation tillage and “no-till” means reduced or no mixing of surface applied nutrients through the soil profile
 - CAFO bringing higher amounts of nutrient inputs (mainly feed) onto farm than can be used
 - lack of resources and knowledge to adequately manage increased manure volume of CAFO
 - economical and readily available source of nitrogen and phosphorus through biosolids

SLIDE 6: Phosphorus Issue

- Crop operations can easily manage nitrogen and phosphorus applications by custom blending fertilizer
- Animal operations, in some cases, may not have an economical viable alternative to land application- Sharpley-1997

SLIDE 7: Phosphorus Issue - Additions/Revisions

- Need to address CAFO operations to minimize nutrient loss
- Need to address over application of phosphorus from other nutrient sources where viable alternatives of disposal exist
- Federal CAFO regulations contain requirements that nitrogen and phosphorus be addressed
- Neighboring Mid-Atlantic states have adopted specific phosphorus criteria for plan development

SLIDE 8: Phosphorus Issue-“Goal” - Sharpley-1997

- The overall goal of efforts to reduce P losses from agriculture to surface waters, should aim to balance off-farm inputs on P in feed and fertilizer with outputs in produce along with managing soils in ways that retain nutrient and added P resources

SLIDE 9: Nitrogen Application Timing - 4 VAC 5-15-150.4.a

- Timing recommendations for nutrient applications shall be as close to plant nutrient uptake as reasonable. To reduce the potential for nutrient leaching or runoff, a certified nutrient management planner shall recommend planting an agronomically feasible crop within 30 days of the planned nutrient application if no actively growing crop is in place.

SLIDE 10: Nitrogen Application Timing - 4 VAC 5-15-150.4.a

- For organic nutrient sources, planned applications may be recommended between December 21, and March 16, if necessary, if a crop will be planted during the normal spring planting season and sites have low surface runoff potential due to slope or crop residue or if management practices such as injection are recommended to reduce the potential for surface runoff of organic nutrient sources.

SLIDE 11: Nitrogen Application Timing - 4 VAC 5-15-150.4.c

- Nutrient applications on frozen or snow covered grounds should be avoided. If an emergency situation such as storage system freeze-up necessitates the application of organic nutrient sources, select fields which have slopes of less than five percent (5.0%) which are either planted in cover crops or have significant crop residue present.

SLIDE 12: Nitrogen Application Timing

- Application window of commercial fertilizer as close to crop uptake as possible
- Determine when mineralization of organic nutrient sources is occurring so that maximum utilization of nutrients (mainly nitrogen) is achieved with minimum loss

SLIDE 13: Nitrogen Application Timing - Bitzer and Sims, 1987

- Poultry litter
 - 80 and 86% of total N mineralized from litter occurred within 1 and 2 weeks respectively
 - inorganic N + rapidly mineralized fraction of organic N equals a large quantity of available N in the growing season.

- Fall and winter applications, when crop uptake is minimal, or nonexistent, should be avoided as mineralization of organic N has been shown to occur at temperatures as low as 0°C.

SLIDE 14: Biosolids Leaching Events - Brinsfield and Staver, 1998

- nitrogen and ammonium nitrogen by March of the following year had increased over the control
- A summary of this study is that leaching loss of N was greater and available N was lower
 - with winter-than spring applied biosolids
 - in coarse than fine textured soils
 - during winter and spring months with higher rainfall

SLIDE 15: Nitrogen Application Timing - Evanylo and McGuinn

- Conclusion: Winter application of biosolids on coarse textured soils should be avoided when managing for the control of N leaching losses to groundwater. Biosolids can be applied, with caution, to fine textured soil during the winter with a reduced risk of N leaching
- Given the unpredictability of temperature and rainfall in the winter, the overall recommendation is that biosolids should be applied only in the spring to ensure that the crop takes up as much biosolids-derived N as possible.

SLIDE 16: Nitrogen Application Timing - Evanylo and McGuinn

- Spring applied biosolids have the potential to reduce N pollution as compared to spring applied N fertilizer because of greater resistance to N leaching

SLIDE 17: Nitrogen Application Timing

- These studies show that mineralization is occurring at a higher rate and longer into the winter season than originally thought when the regulations were written
- Supports the present nutrient management criteria but may not be adequate to reduce nitrogen loss during late fall and winter seasons

Attachment #4

PPT Presentation Slide Text for: Phosphorus: Initial Identification of Pros/Cons, Cost/Benefits of Three Methods (Soil test, Environmental threshold, P-Index)

SLIDE 1: Phosphorus Management Criteria Options Identified by NRCS & EPA

- Agronomic Soil Test Phosphorus Recommendations
- Environmental Threshold Soil Phosphorus Levels
- Phosphorus Site Index
- Combinations or hybrid approaches

SLIDE 2: Agronomic Soil Test - Phosphorus Recommendations

- Apply nutrient sources at the level recommended in a soil test (based on crop response research)

SLIDE 3: Agronomic Soil Test - Phosphorus Recommendations

CR = Crop Removal Amounts

<u>Soil Test Phosphorus Level</u>	<u>Phosphorus Application</u>
Low	Rapid Build-up
Medium	Moderate Build-up
High	Maintenance
Very High	No P Application

SLIDE 4: Environmental Threshold Soil Phosphorus Levels

- Apply organic nutrient sources at the nitrogen based rate if soil phosphorus levels are below the threshold
- Phosphorus based or no P applications when soil phosphorus levels meet or exceed threshold values

SLIDE 5: Environmental Threshold Soil Phosphorus Levels

CR = Crop Removal Amounts

<u>Soil Test Phosphorus Level</u>	<u>Phosphorus Application</u>
< $\frac{3}{4}$ TH	N Based
> $\frac{3}{4}$ TH, < $1\frac{1}{2}$ TH	P Based @ $1.0 \times \text{CR}$
> $1\frac{1}{2}$ TH, < 2 TH	P Based @ $0.5 \times \text{CR}$
= > 2 TH	P Based @ No P

SLIDE 6: Phosphorus Site Index

- Evaluate the erosion, runoff, and leaching risk (transport factors) for the site as well as soil test phosphorus levels, proposed P application rates and placement (source factors)
- N based applications if site is low risk, P based if medium or high risk, no P application if high risk

SLIDE 7: Phosphorus Site Index

CR = Crop Removal Amounts

<u>P-Index Rating</u>	<u>Phosphorus Application</u>
Low	N Based
Medium	P Based @ 1.5 x CR
High	P Based @ 1.0 x CR
Very High	P Based @ No P

SLIDE 8: Advantages of Agronomic Soil Test - Phosphorus Recommendations

- Protects water quality by limiting P applications to sites where an agronomic crop need exists
- Relatively easy and time efficient to apply
- Results between users should be consistent
- Easy to understand and explain
- Compatible with existing NutMan software and can be incorporated to allow the use of a single program by planners
- Quick to adjust for changes in cropping systems
- Only external input needed is the soil analysis result

SLIDE 9: Disadvantages of Agronomic Soil Test - Phosphorus Recommendations

- Recommendations based in crop response to applied phosphorus, not direct potential for water quality impact
- Generally more restrictive P applications than other approaches, economically more difficult on farms with excess phosphorus
- Does not consider transport risks, such as soil erosion, runoff characteristics of soils, proximity to water and placement of phosphorus applications (surface applied v. soil incorporated)

SLIDE 10: Advantages of Environmental Threshold Soil Phosphorus Levels

Criteria is based on water quality impact and not crop agronomic needs

- Protects water quality by limiting P applications on sites where phosphorus runoff concentrations would cause a water quality hazard
- Relatively easy and time efficient to apply
- Results between users should be consistent
- Relatively easy to understand and explain
- Can be incorporated into existing NutMan software (with some work) to allow the use of a single program by planners
- Probably allows higher rates of P application than soil test method on many sites
- Quick to adjust for changes in cropping systems
- Only external input needed is the soil analysis result

SLIDE 11: Disadvantages of Environmental Threshold Soil Phosphorus Levels

- Does not consider transport risks, such as soil erosion, runoff characteristics of soils, proximity to water and placement of phosphorus applications (surface applied v. soil incorporated)

SLIDE 12: Advantages of Phosphorus Site Index

- Criteria is based on water quality impact and not crop agronomic needs
- Protects water quality by limiting P applications on sites where phosphorus transport from the field would cause a water quality hazard
- Sites with lower transport risk can apply higher rates of P than with soil test method
- Management can reduce transport risk (example soil erosion control)

SLIDE 13: Disadvantages of Phosphorus Site Index

- Relatively complex and time consuming to apply
- Results between users may be less consistent
- Somewhat difficult to understand and explain
- Uncertain if complete process can be incorporated into NutMan software program, users may have to use at least three separate computer programs
- Very data intensive - many external inputs (some work has been done to try to reduce some of these)
- Plan development expense will increase
- Changes in cropping systems and/or tillage will require the index to be re-run

SLIDE 14: Possible Combinations or Hybrid Approaches

- Incorporate soil erosion criteria into Environmental Threshold method to give a benefit to implementing a soil conservation plan, or
- Develop a rapid phosphorus assessment and allow planners to use either it or a P-Index, or
- ?